

Knowledge-Based System Environment

Example: CLIPS

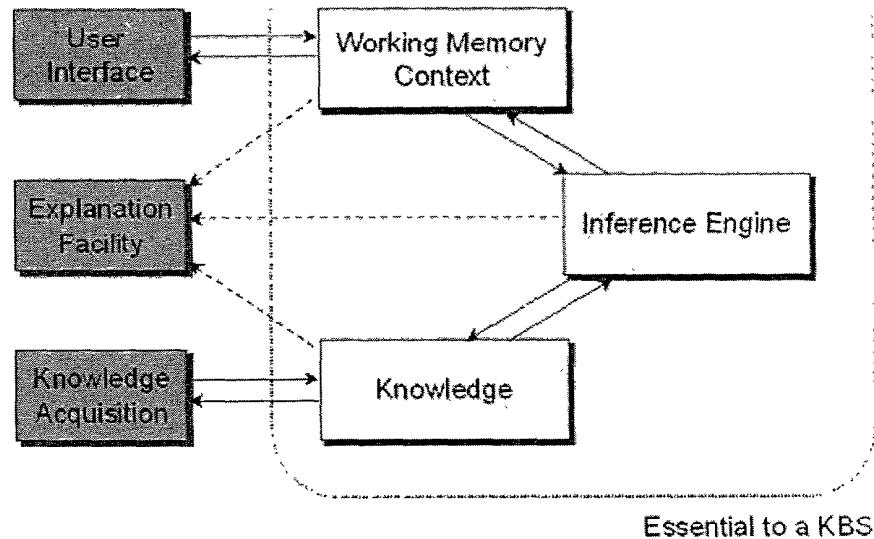


FIG. 1

BELIEF NETWORKS

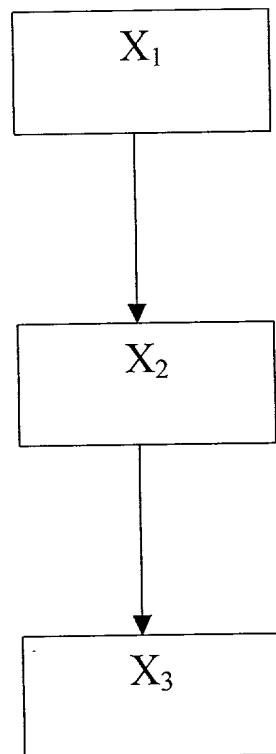


FIG. 2

3-D ELICIT MODEL

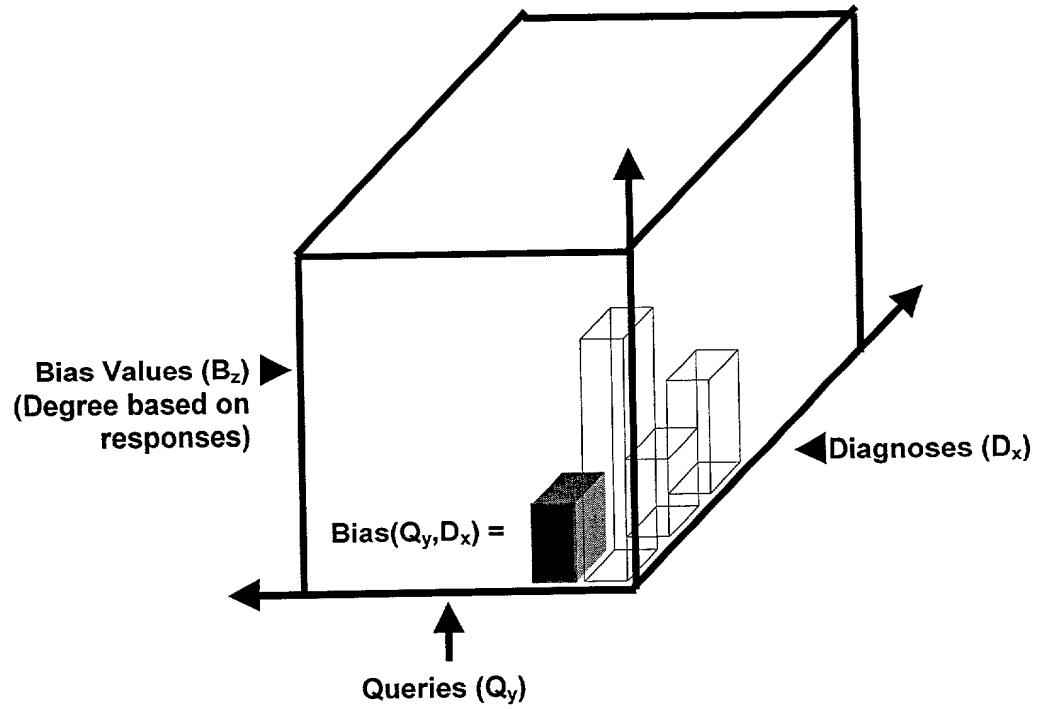
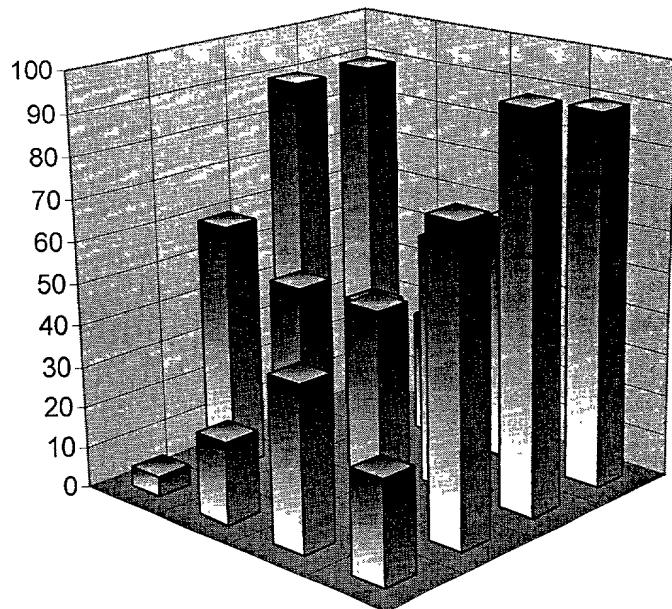


FIG. 3

Sample 3-D Model



$$\text{Bias} = B(D_1, Q_1) = 90$$

| | D ₁ | D ₂ | D ₃ | D ₄ |
|----------------|----------------|----------------|----------------|----------------|
| Q ₁ | 90 | 80 | 45 | 55 |
| Q ₂ | 100 | 20 | 85 | 15 |
| Q ₃ | 25 | 45 | 90 | 95 |
| Q ₄ | 45 | 65 | 20 | 80 |

FIG. 4

End Implementation

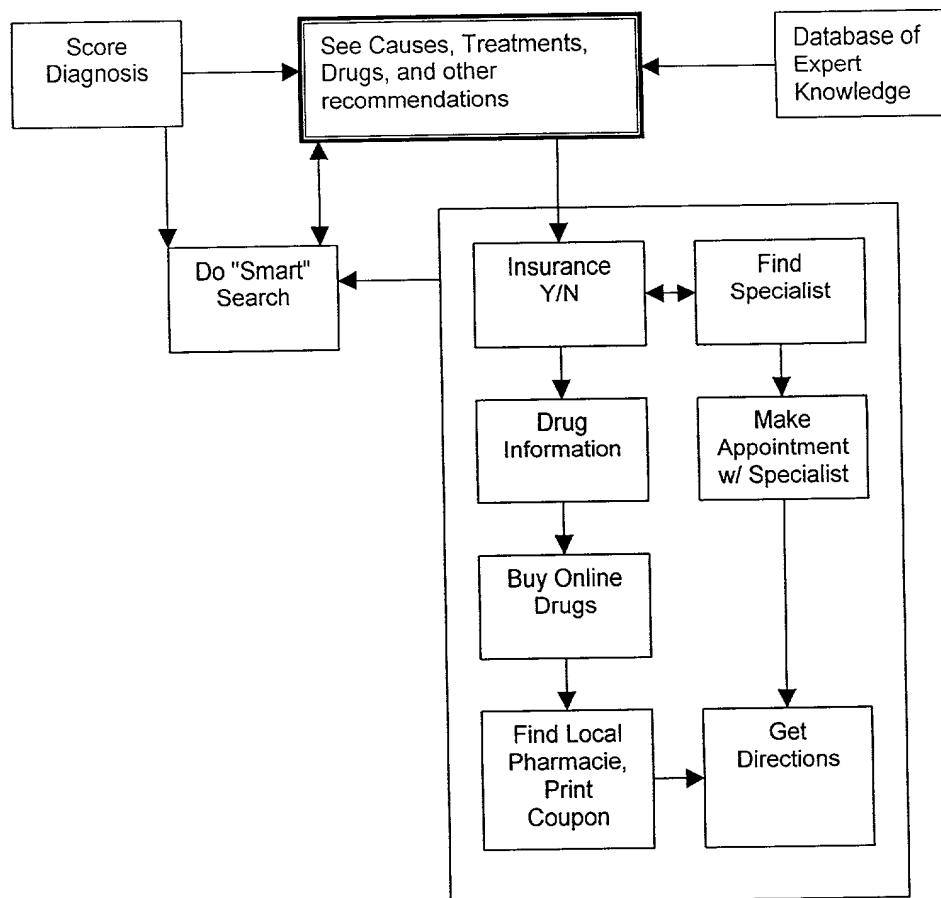


FIG. 5

Process - Acquisition of Expert Data

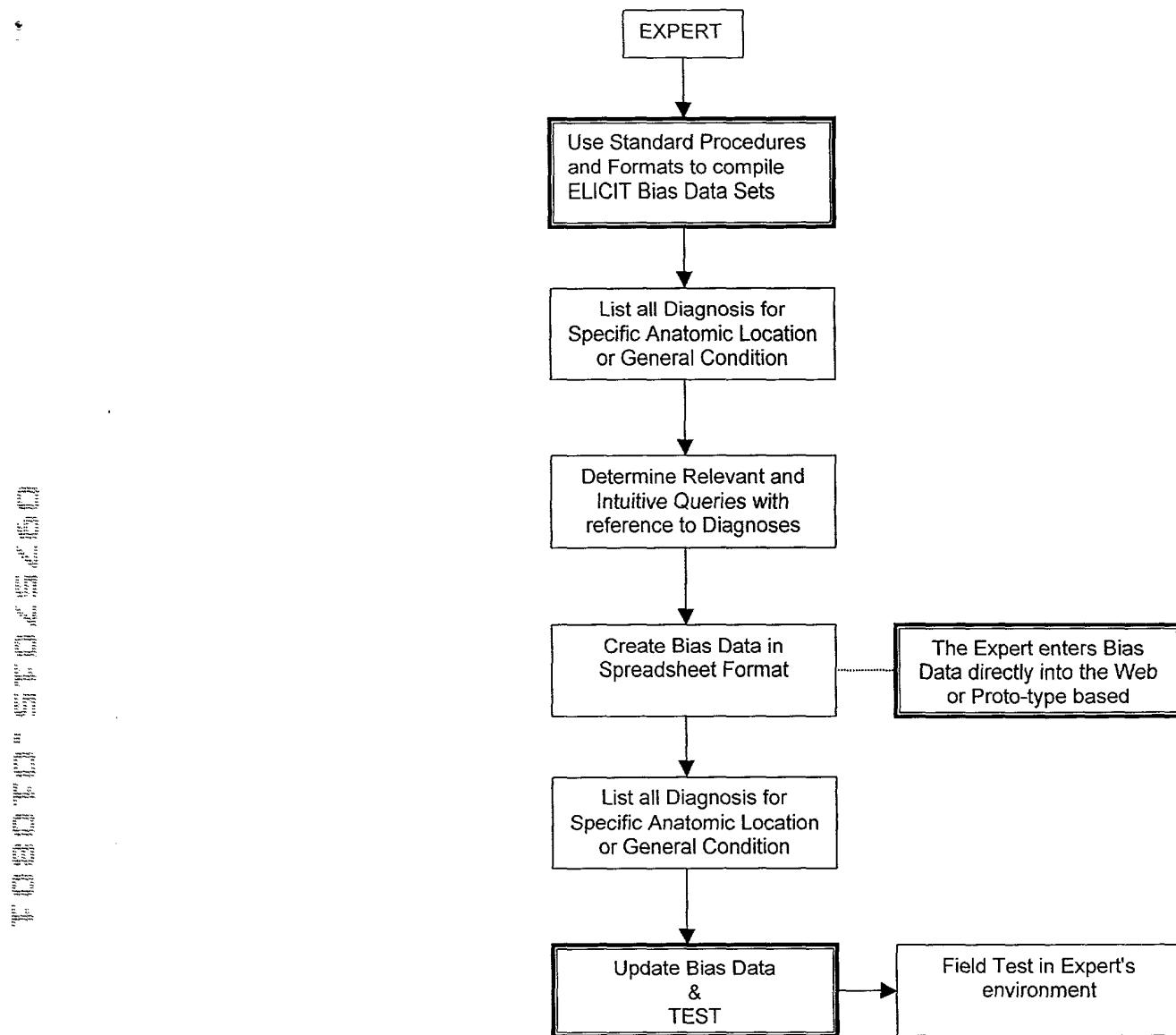


FIG. 6

SAMPLE EXPERT 3D-DATA INPUT SCREEN

| MENU | | Add Query Add Diagnosis | | | |
|-------------------------------------|---|------------------------------|-----------------------------|-----------------------------|---|
| | | ▼ Queries ▼ | Diagnoses ► | | |
| | | ACL Tear | PCL Tear | MM Tear | L |
| <input type="button" value="Edit"/> | Was there an injury? | 90 <input type="checkbox"/> | 90 <input type="checkbox"/> | 90 <input type="checkbox"/> | |
| <input type="button" value="Edit"/> | Did you trip or fall? | 20 <input type="checkbox"/> | 30 <input type="checkbox"/> | 30 <input type="checkbox"/> | |
| <input type="button" value="Edit"/> | Were you in an accident involving a vehicle? | 30 <input type="checkbox"/> | 30 <input type="checkbox"/> | 20 <input type="checkbox"/> | |
| <input type="button" value="Edit"/> | Were you playing a sport? | 70 <input type="checkbox"/> | 70 <input type="checkbox"/> | 70 <input type="checkbox"/> | |
| <input type="button" value="Edit"/> | Did you twist your knee? | 70 <input type="checkbox"/> | 70 <input type="checkbox"/> | 70 <input type="checkbox"/> | |
| <input type="button" value="Edit"/> | Did you injure your knee while jumping? | 60 <input type="checkbox"/> | 60 <input type="checkbox"/> | 60 <input type="checkbox"/> | |
| <input type="button" value="Edit"/> | Was the injury pain immediate? | 80 <input type="checkbox"/> | 70 <input type="checkbox"/> | 60 <input type="checkbox"/> | |
| <input type="button" value="Edit"/> | Was the injury pain delayed? | 20 <input type="checkbox"/> | 30 <input type="checkbox"/> | 30 <input type="checkbox"/> | |
| <input type="button" value="Edit"/> | Was the injury swelling immediate? | 80 <input type="checkbox"/> | 70 <input type="checkbox"/> | 60 <input type="checkbox"/> | |
| <input type="button" value="Edit"/> | Was the injury swelling delayed? | 20 <input type="checkbox"/> | 30 <input type="checkbox"/> | 30 <input type="checkbox"/> | |
| <input type="button" value="Edit"/> | Was there swelling above or around the kneecap? | 95 <input type="checkbox"/> | 85 <input type="checkbox"/> | 80 <input type="checkbox"/> | |
| <input type="button" value="Edit"/> | Walking in general or level ground | 10 <input type="checkbox"/> | 10 <input type="checkbox"/> | 40 <input type="checkbox"/> | |
| <input type="button" value="Edit"/> | Walking up or down hills | 20 <input type="checkbox"/> | 20 <input type="checkbox"/> | 40 <input type="checkbox"/> | |
| <input type="button" value="Edit"/> | Running | 30 <input type="checkbox"/> | 20 <input type="checkbox"/> | 40 <input type="checkbox"/> | |
| <input type="button" value="Edit"/> | Biking | 20 <input type="checkbox"/> | 10 <input type="checkbox"/> | 30 <input type="checkbox"/> | |
| <input type="button" value="Edit"/> | Squatting | 30 <input type="checkbox"/> | 20 <input type="checkbox"/> | 80 <input type="checkbox"/> | |
| <input type="button" value="Edit"/> | While sitting | 20 <input type="checkbox"/> | 10 <input type="checkbox"/> | 40 <input type="checkbox"/> | |

FIG. 7

Set Response Ranking

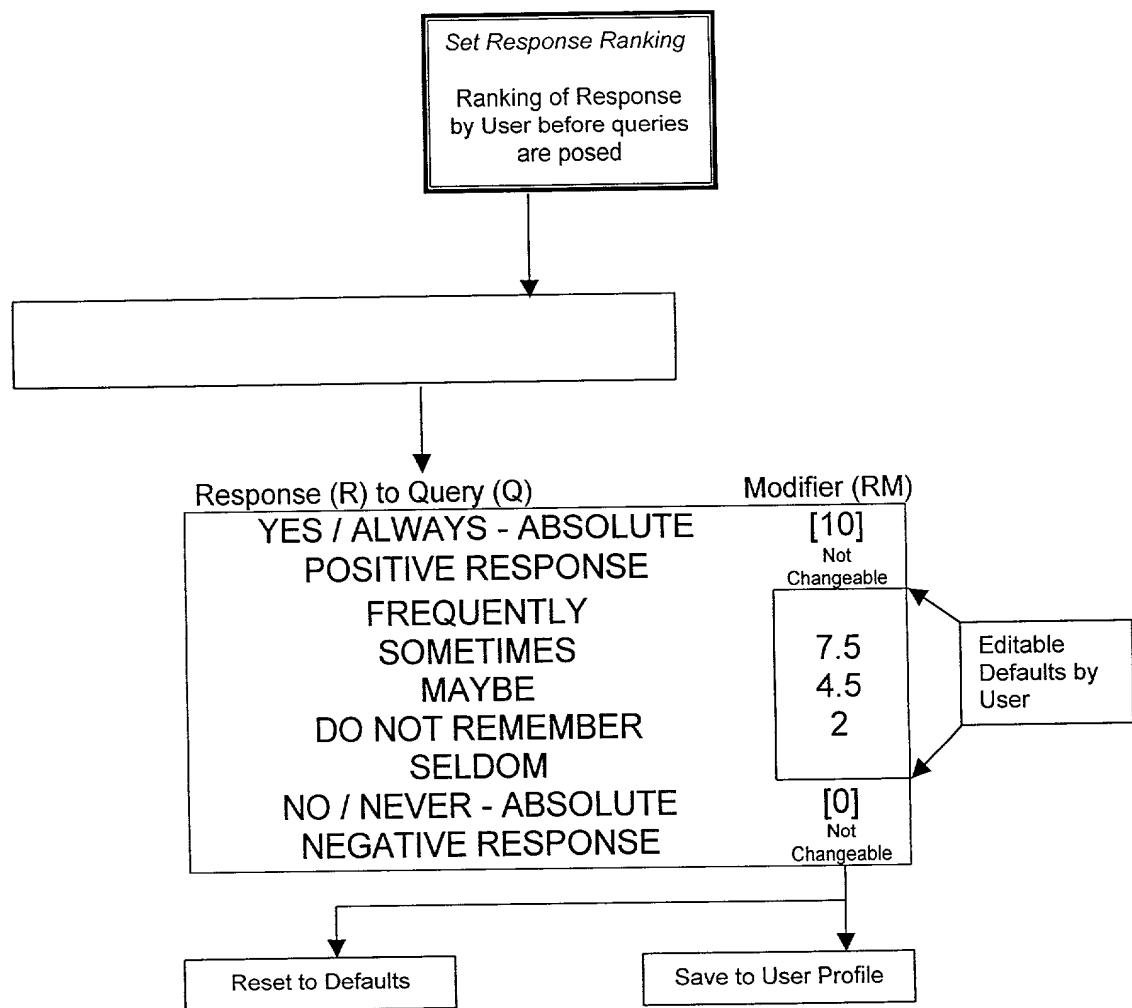


FIG. 8

COMPUTER

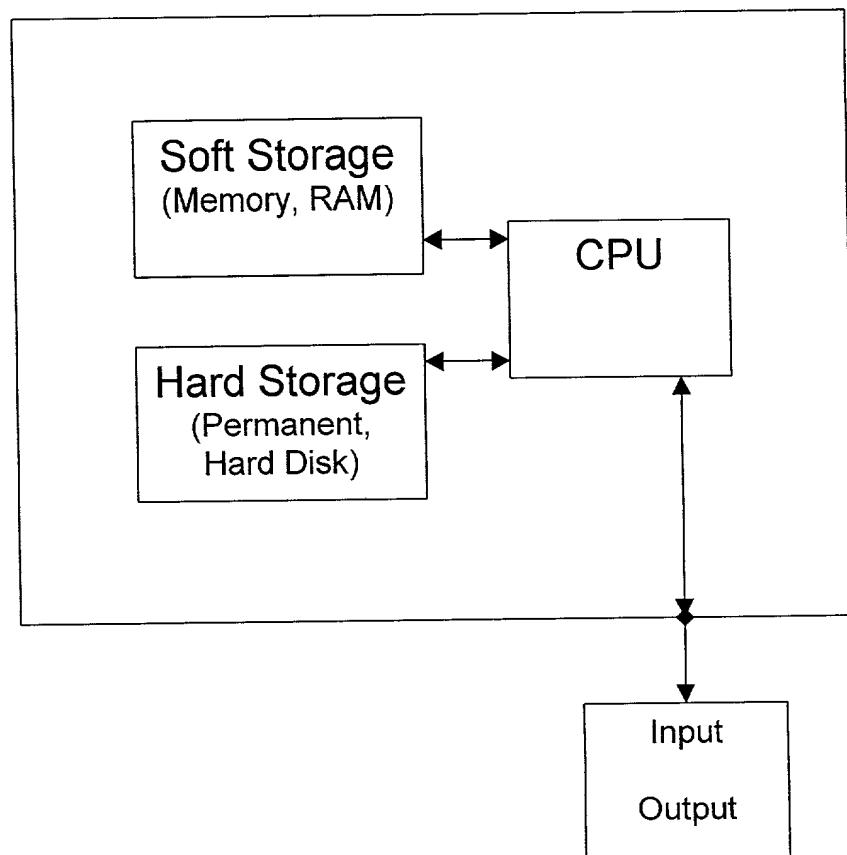


FIG. 9

General Description

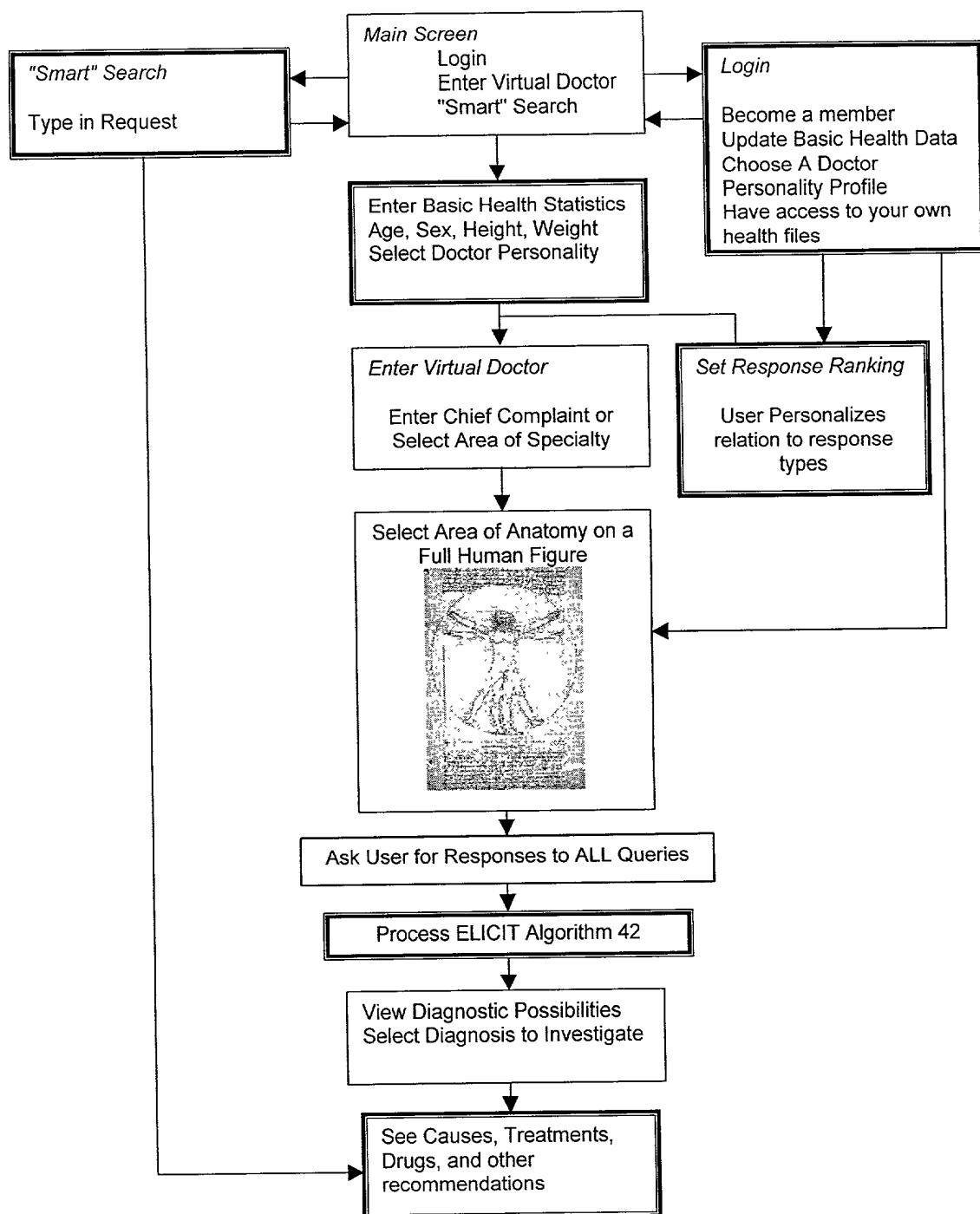


FIG. 10

Login / Enter Basic Health Stats

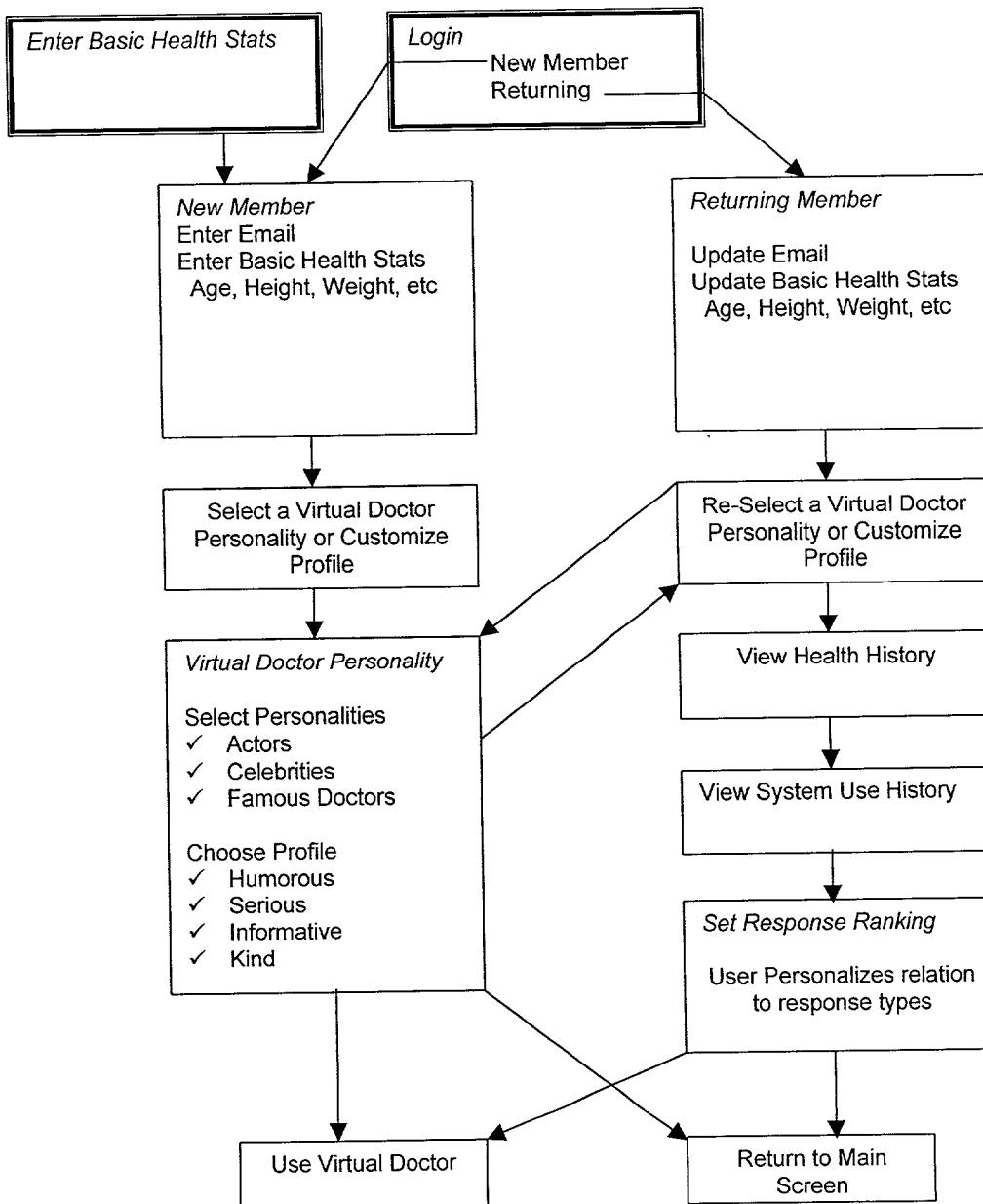


FIG. 11

"Smart" Search

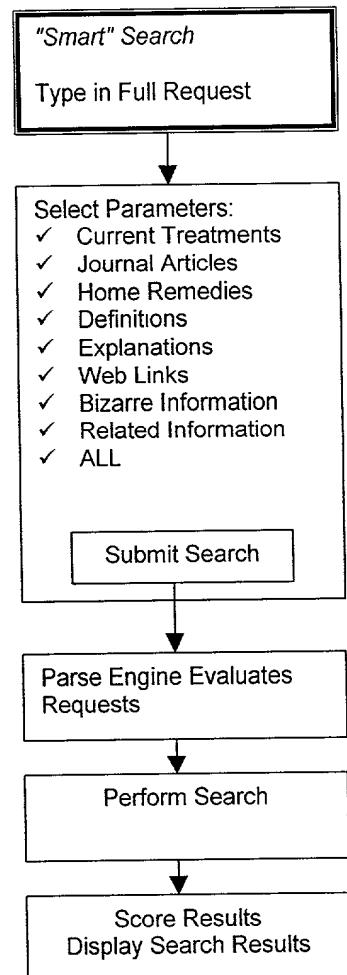


FIG. 12

ELICIT Algorithm 42 (Processing Responses to Queries)

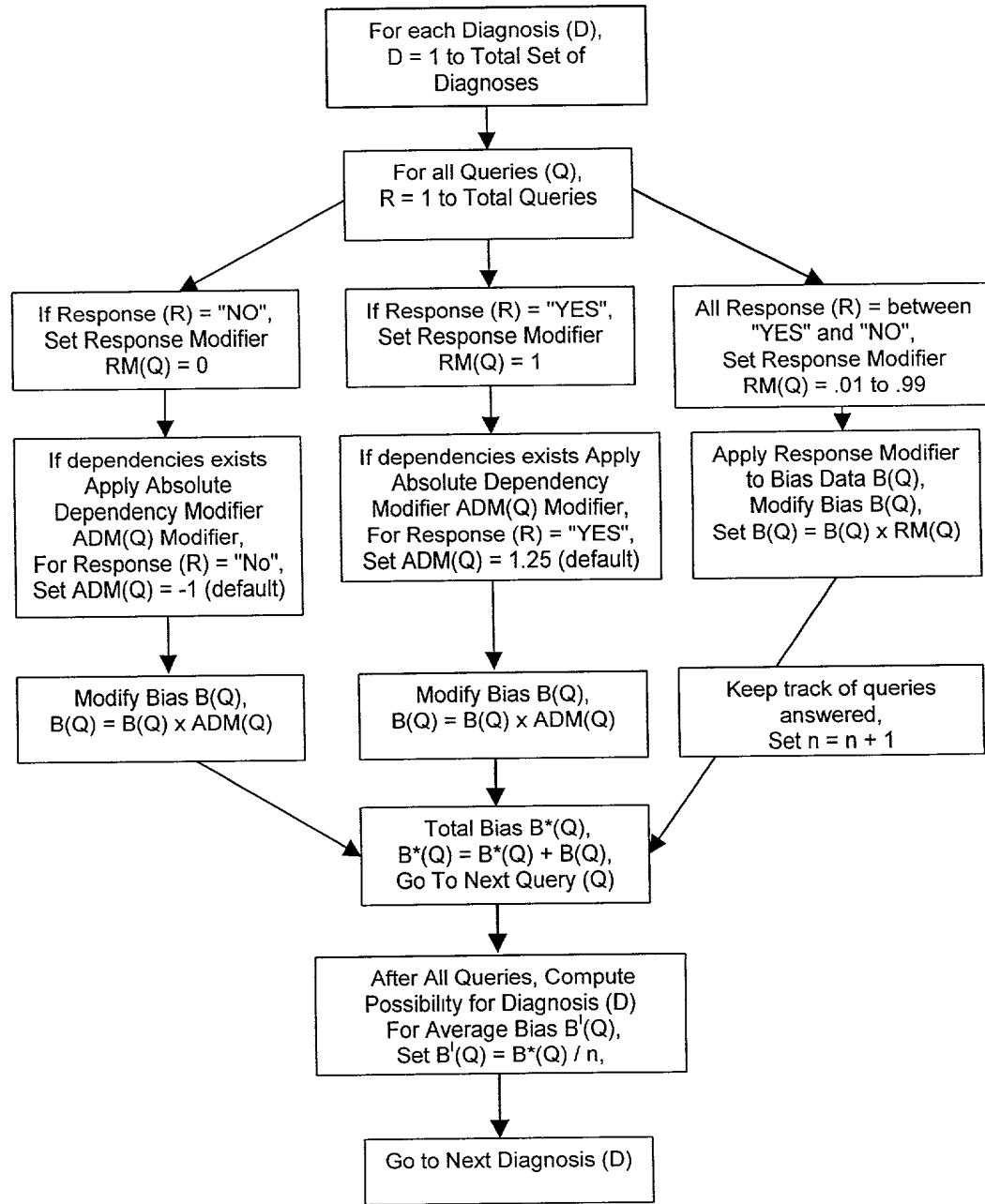


FIG. 13

Please circle/select all the areas where you feel tenderness or pain/discomfort pain?

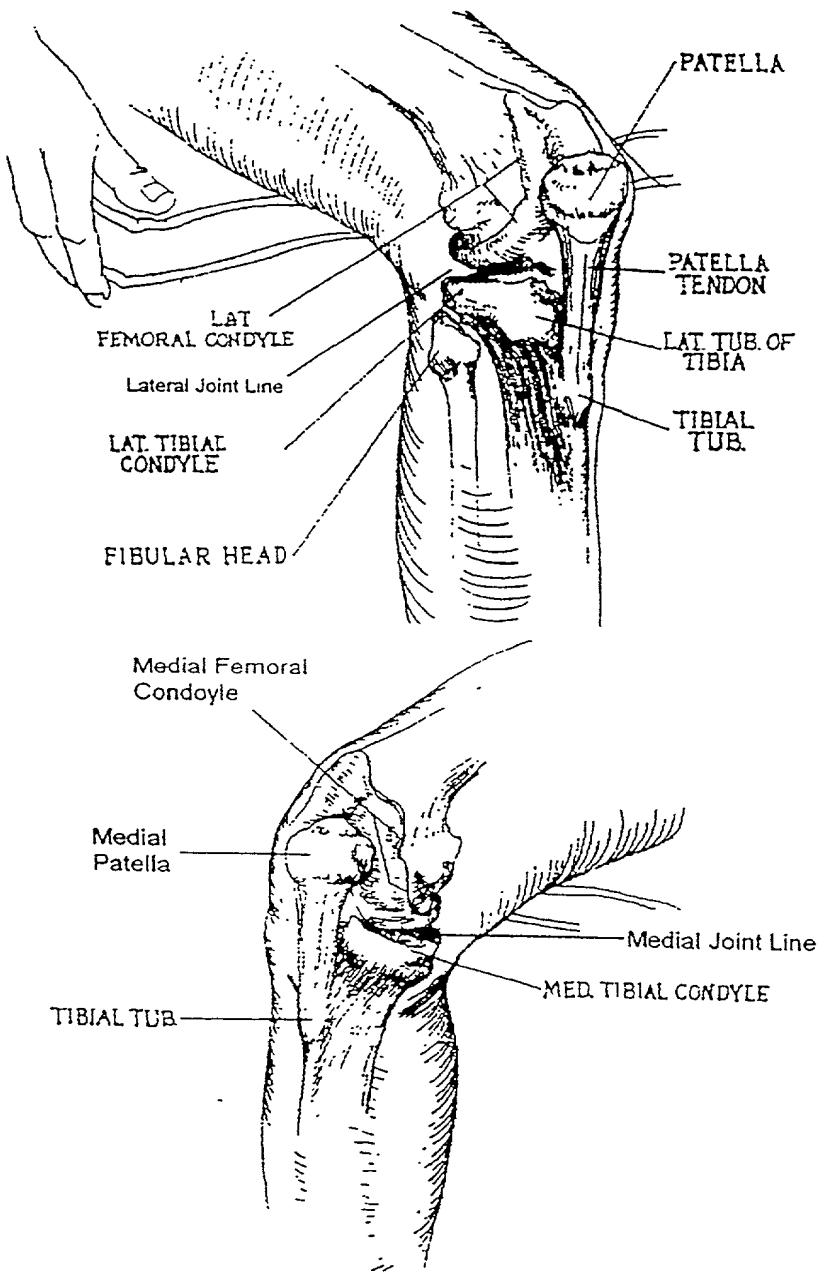


FIG. 14

Don't wait for Doctors online anymore!

Your Personal Online Doctor...Now!

Want to know what could be wrong with you instantly and get specific information on insurance, treatments, specialists, prescriptions, home remedies and more ?

Just use our free "Virtual Doctor" application with utilizes advanced logic technology to accurately determine your paticular aligment. Ofcourse, you should never use this service to replace professional medical advice from your physician. Infact, we recommend always to seek professional medical advice regardless of the diagnostic response you recieve.

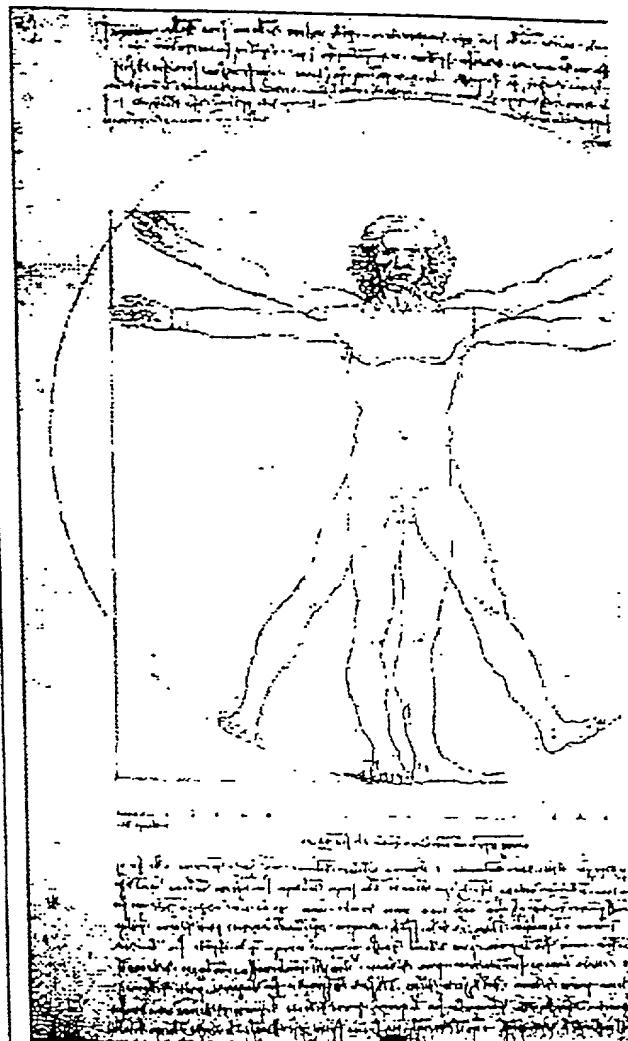


FIG. 15

Non-Injury Activities. Please select any activity that causes pain or discomfort.

No Walking in general or level ground ([help](#))
No Walking up or down hills ([help](#))
No Running ([help](#))
Yes Biking ([help](#))
Sometimes Squatting ([help](#))
Maybe While sitting ([help](#))
No Extended sitting ([help](#))
Don't remember In notion standing UP ([help](#))
No In motion sitting DOWN ([help](#))

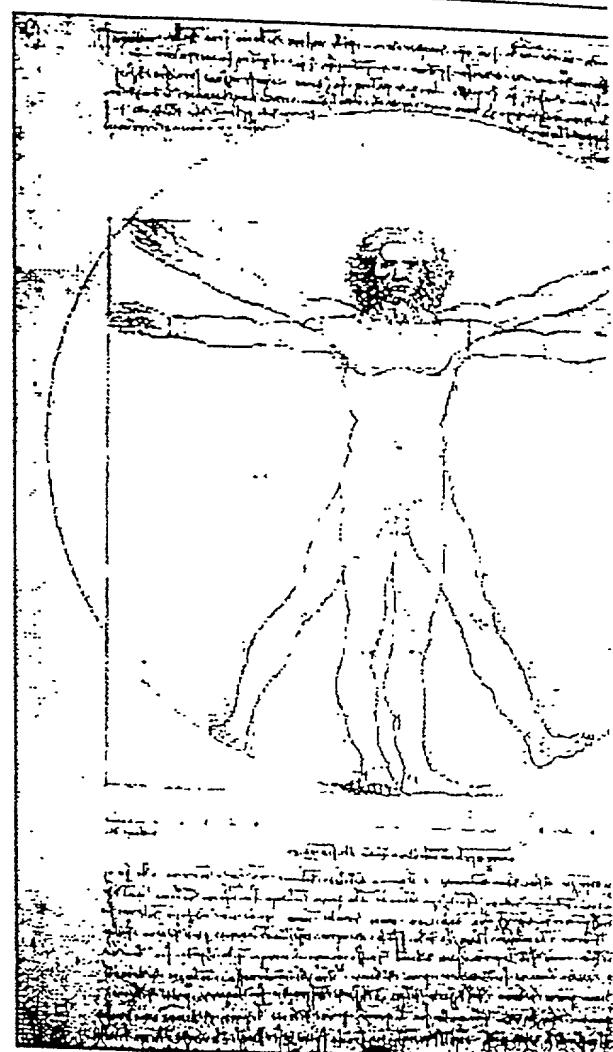


FIG. 16

ELICIT Scalar Range, Rules, Possibility Scoring

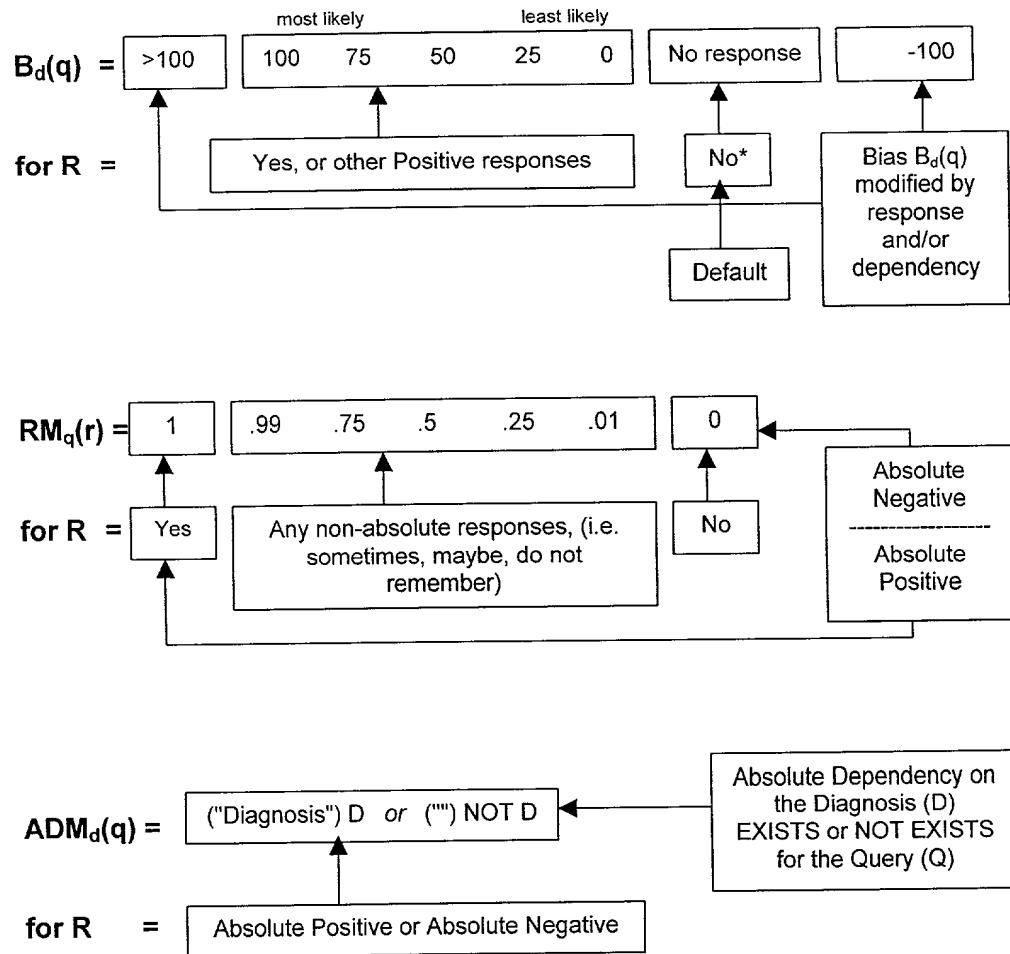


FIG. 17

Enter Questionnaire

Edit Data

**Edit Data by
Questions**

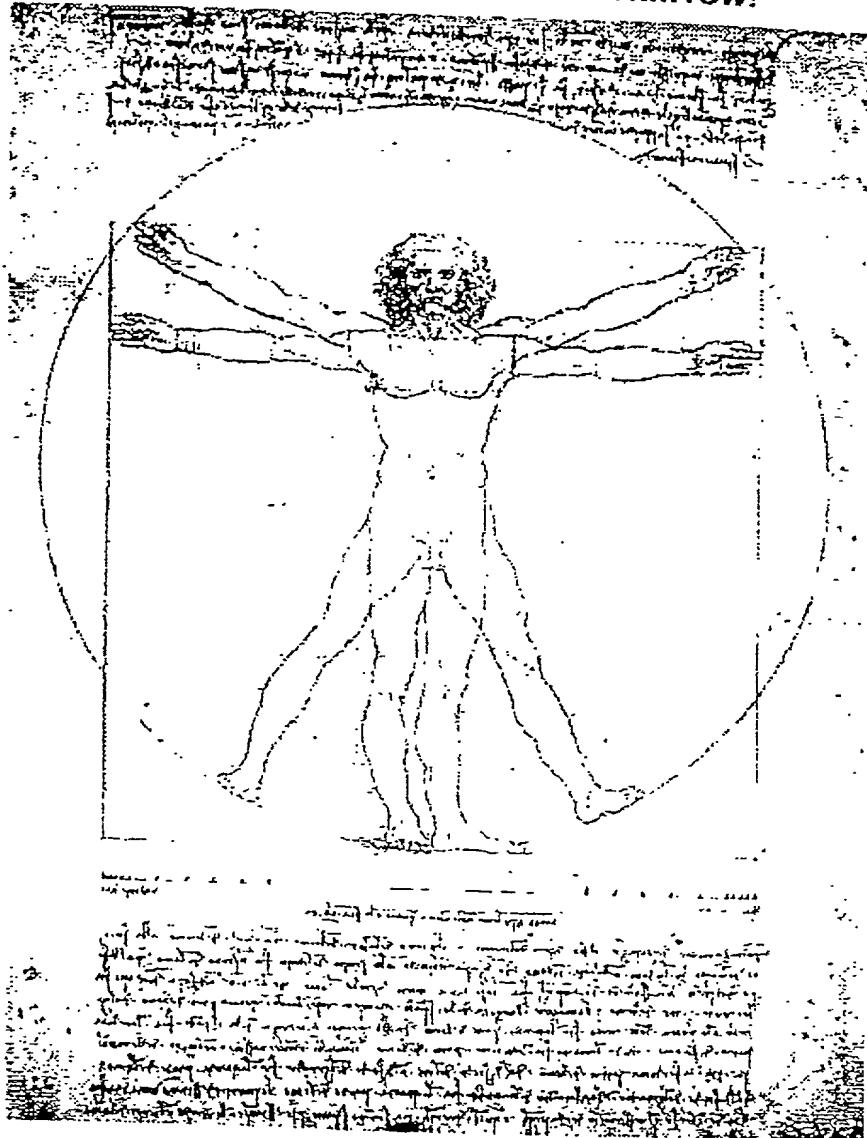


FIG. 18

Knee

Answer
Question
s that
apply

MAIN

Clear All

Was it a recent injury?
Did you trip or fall?
Were you in an accident involving a vehicle?
Yes Were you playing a sport?
Did you twist your knee?
Did you injury your knee while jumping?
Was the injury pain immediate?
Was the injury pain delayed?
Was the injury swelling immediate?
Was the injury swelling delayed?
Yes Is there swelling above or around the kneecap?
Sometimes Walking in general or level ground
Sometimes Walking up or down hills
Yes Running
Sometimes Biking
Sometimes Squatting
While sitting
Extended sitting
In notion standing UP
In motion sitting DOWN
Has your knee ever locked up?
Do you feel a general stiffness?
You CAN NOT straighten your leg?
Does your knee give out?
Does your knee give out while walking straight?
Does your knee give out while changing directions?
Do you feel a loose body floating around?
Yes Is the skin color around your knee normal?
Is the skin color around your knee black or blue?
Is there redness aound the knee area?
Is there progressive angulation ?
Yes Is there arindina or arating?

FIG. 19

Resume

SCANNED, # 6

| Total Questions Answered | 2 |
|--------------------------|------------------------------|
| 1 | Area Diagnosis |
| 2 | Ankle Sprain III |
| 3 | Ankle Sprain I, II |
| 4 | Achilles rupture |
| 5 | Osteochondritis Dissecans |
| 6 | Morton's Neuroma |
| 7 | Stress Frx of 2nd metatarsal |
| 8 | Plantar Fasciitis |
| 9 | Pez Planus |
| 10 | Accessory Navicular |
| 11 | Bunion |
| 12 | Posterior tibialis syndrome |
| 13 | Hammer toe |
| 14 | Degenerative Arthritis |
| 15 | Gout |
| 16 | Infection |

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FIG. 20

Edit Fuzzy Data

SCANNED, # 6

MAIN

◀ Previous

Next ►

FIG. 21

| | |
|----------------|----------------------|
| PHYSICAL AREA | Knee |
| AREA DIAGNOSIS | Patella Malalignment |

| Fuzzy Questions | Fuzzy Data | Diagnostically Dependent | Fuzzy Response |
|--|------------|--------------------------|----------------|
| Was it a recent injury? | 30 | Yes | Yes |
| Did you trip or fall? | 20 | Yes | Yes |
| Were you in an accident involving a vehicle? | 20 | Yes | Yes |
| Were you playing a sport? | 50 | Yes | Yes |
| Did you twist your knee? | 40 | Yes | Yes |
| Did you injure your knee while jumping? | 70 | Yes | Yes |
| Was the injury pain immediate? | 60 | Yes | Yes |
| Was the injury pain delayed? | 40 | Yes | Yes |
| Was the injury swelling immediate? | 20 | Yes | Yes |
| Was the injury swelling delayed? | 70 | Yes | Yes |
| Is there swelling above or around the kneecap? | 40 | Yes | Yes |
| Walking in general or level ground | 40 | Yes | Sometimes |
| Walking up or down hills | 70 | Yes | Sometimes |
| Running | 80 | Yes | Yes |
| Biking | 70 | Yes | Sometimes |
| Squatting | 70 | Yes | Sometimes |
| While sitting | 70 | Yes | Yes |
| Extended sitting | 90 | Yes | Sometimes |
| In motion standing UP | 60 | Yes | Yes |

Edit Fuzzy Data

MAIN ◀ Previous Next ▶ New Diagnosis

| | | |
|--|----|-----|
| In motion sitting DOWN | 40 | Yes |
| Has your knee ever locked up? | 40 | Yes |
| Do you feel a general stiffness? | 50 | Yes |
| You CAN NOT straighten your leg? | 20 | Yes |
| Does your knee give out? | 80 | Yes |
| Does your knee give out while walking straight? | 80 | Yes |
| Does your knee give out while changing directions? | 50 | Yes |
| Do you feel a loose body floating around? | 30 | Yes |
| Is the skin color around your knee normal? | 90 | Yes |
| Is the skin color around your knee black or blue? | 20 | Yes |
| Is there redness aound the knee area? | 10 | Yes |
| Is there progressive angulation? | 10 | Yes |
| Is there grinding or grating? | 80 | Yes |
| Is there any popping or snapping? | 70 | Yes |
| Do you feel weakness in the knee? | 30 | Yes |
| Do you have a fever? | 10 | Yes |
| Do you generally feel weak or tired? | 20 | Yes |
| Is there numbness anywhere? | 10 | Yes |
| At the time of injury, did you feel your knee pop out? | 50 | Yes |
| At the time of injury, did you feel a crack? | 50 | Yes |
| medial femoral condyle check | 50 | Yes |
| medial joint line check | 20 | Yes |
| medial tibial plateau check | 20 | Yes |
| medial patella check | 90 | Yes |

SCANNED, # 6

FIG. 22

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Edit Fuzzy Data

卷之三

FIG. 23

MAIN

Previous

New Diagnosis

New Diagnosis
Next ▶

| | | | |
|-----|---|----|--------------------------|
| Yes | lateral patella check | 70 | <input type="checkbox"/> |
| | tibial tubricle check | 40 | <input type="checkbox"/> |
| | lateral femoral condoyle check | 30 | <input type="checkbox"/> |
| | lateral joint line check | 20 | <input type="checkbox"/> |
| | lateral tibial plateau check | 10 | <input type="checkbox"/> |
| | anterior patella check | 40 | <input type="checkbox"/> |
| | posterior knee check | 10 | <input type="checkbox"/> |
| | Is there swelling above or around the kneecap? | 55 | <input type="checkbox"/> |
| | Is there swelling in front of the kneecap? | 20 | <input type="checkbox"/> |
| | Is there constant pain? | 20 | <input type="checkbox"/> |
| | Is there chronic pain? | 25 | <input type="checkbox"/> |
| | Age 16 to 40 | 60 | <input type="checkbox"/> |
| | 40 to 60 | 40 | <input type="checkbox"/> |
| | 60 to 80 | 25 | <input type="checkbox"/> |
| | over 80 | 15 | <input type="checkbox"/> |
| | Do you feel a bump or mass? | 10 | <input type="checkbox"/> |
| | straighten your knee, can you feel a tender band of tissue on the inside of | 40 | <input type="checkbox"/> |
| | Pain wakes at night | 15 | <input type="checkbox"/> |
| | Have you ever felt your knee cap pop out? | 70 | <input type="checkbox"/> |

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Yes

Edit Fuzzy Data

It is the same with the other two, but they are not so well known.

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FIG. 24

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New Diagnoses

Next ▾

Previous

MAIN

SICAL AREA Knee
DIAGNOSIS Patella Malalignment

◀ Previous **Next ▶**

| | |
|-------|-------------------|
| 863 | Total Percentages |
| 20 | Total Queries |
| 43.15 | Final Calculation |

SICAL AREA Knee DIAGNOSIS Patella Malalignment

Re-evaluate



Was there an injury?

| | | |
|----------------|-----------------------------|----|
| Ability | Area Diagnosis | |
| 3 | Ankle Sprain III | 95 |
| 5 | Ankle Sprain I, II | 90 |
| 5 | Achilles rupture | 70 |
| 3 | Osteochondritis Dissecans | 75 |
| 3 | Morton's Neuroma | 25 |
| 3 | Stress Fx of 2nd metatarsal | 15 |
| 3 | Plantar Fasciitis | 20 |
| | Pez Planus | 5 |
| | Accessory Navicular | 15 |
| | Bunion | 5 |
| | Posterior tibialis syndrome | 10 |
| | Hammer toe | 5 |
| | Degenerative Arthritis | 10 |
| | Gout | 5 |
| | Infection | 5 |

Answer:
Maybe

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FTG. 25

Name _____ Age _____ Sex _____ Height _____ Weight _____

Injury Activities

- Was there an injury?
- Did you trip or fall?
- Were you in an accident involving a vehicle?
- Were you playing a sport?
- Please enter the sport you were playing:
- Was it a twisting injury?
- Did you injure your knee in a jumping sport?
- Was the pain immediate or delayed?
- Was the swelling immediate or delayed?

Injury History:

- At the time of your injury, did you feel a pop in the knee?
- At the time of injury, did you feel a crack in the knee?
- Have you ever felt your knee cap pop out?

If your injury was not recent, please select all the activities that create or induce pain or discomfort:

- Walking in general, on level ground
- Walking up or down hills
- Running
- Biking
- Squatting
- While sitting
- Extended Sitting
- In Motion Standing Up
- In Motion Sitting Down

Please select all the conditions that apply to the physical state of the knee or the local area of your discomfort:

- Has your knee ever locked up?
- Do you feel a general stiffness?
- You CAN NOT straighten your leg?
- Does your knee give out?
- Does it give out while walking straight?
- Does it give out while changing directions?
- Do you feel a "loose body" floating in or around the knee? ie. a "marble" floating around?
- Is the skin color normal?
- Is the skin color black or blue?
- Is there any redness around the area?
- Is there any progressive angulation?
- Is there any grinding or grating?
- Is there any popping or snapping?
- Is there any weakness in the knee?

How do you generally feel. Please select any of the general health conditions that apply to you:

- Do you currently have a fever or had a fever in the past 12 hours?
- Do you generally feel weak or tired?
- Is there any numbness anywhere?

A few more questions:

- When you straighten your leg or knee, can you feel a tender band of soft tissue on the inside part of your knee?
- Is there swelling above or around the knee?
- Do you feel a bump or mass around the knee?
- Is there swelling in front of the kneecap?
- Is there any chronic or constant pain?

FIG. 26

Query Object in Database

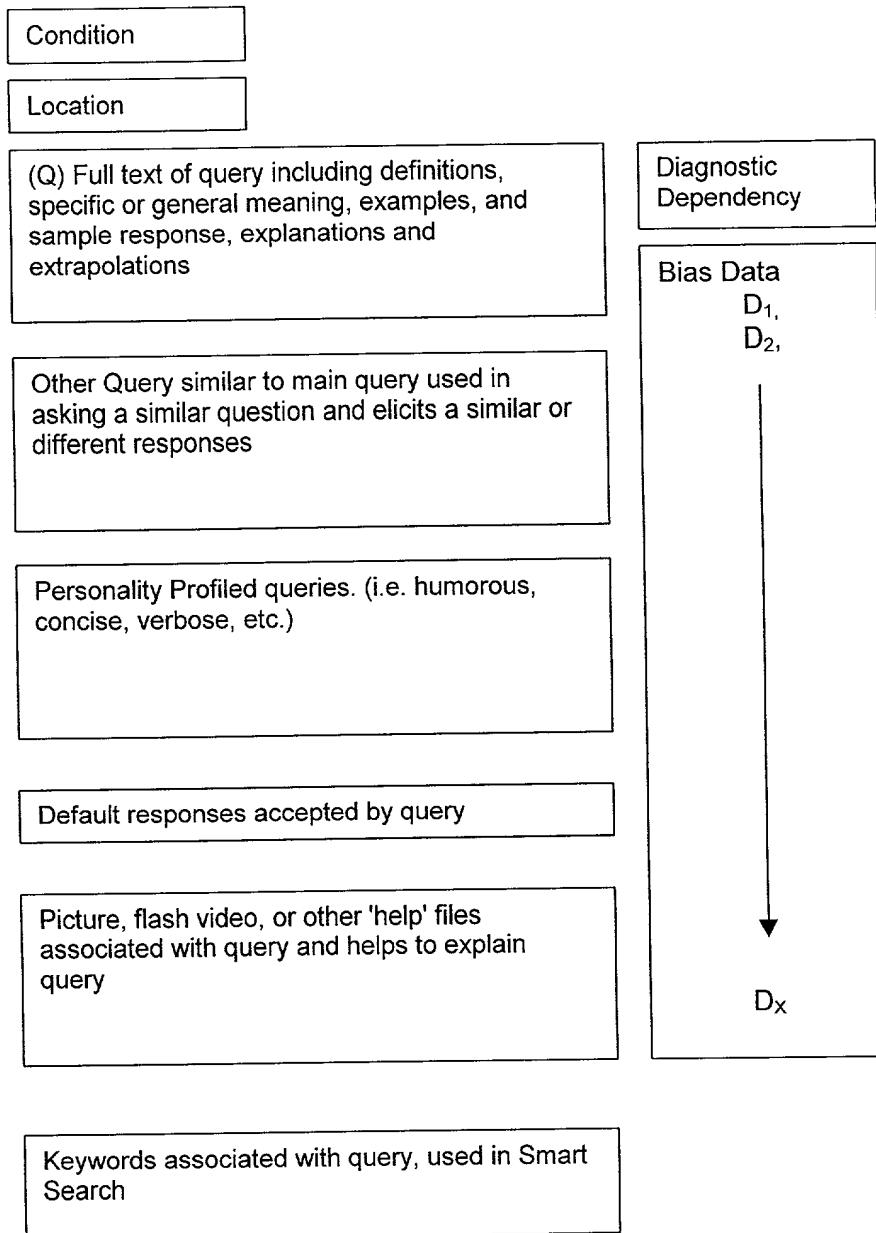


FIG. 27

FIG. 28

H Injury Activities. Please indicate whether you have had an injury recently or in the recent past that may help assess your condition.

- 1 1 0 none Was there an injury?
- 2 1 0 none Were you playing a sport?
- 3 1 0 none Did you trip and fall?
- 4 1 0 none Did you turn your foot inward?
- 5 1 0 none Did you have immediate pain?
- 6 1 0 none Did your ankle/foot swell immediately?

H Injury History. Because of an old injury do any of the following questions apply?

- 7 2 0 none Did you increase your workout/activity lately?
- 8 2 0 none Did you feel a pop in the back of your leg?

H Non-Injury Activities. Please select any activity that causes pain or discomfort.

- 9 3 0 none Walking
- 10 3 0 none Running
- 11 3 0 none Jumping

H Select/Answer any question(s) that apply to your current physical state of the ankle or foot.

- 12 4 0 none Is your ankle swollen?
- 13 4 0 none Is your ankle swollen on the outside (lateral)?
- 14 4 0 none Is your ankle swollen on both sides?
- 15 4 0 none Can you bear weight?
- 16 4 0 none Does your ankle swell intermittently?
- 17 4 0 none Does your ankle lock up?
- 18 4 0 none Can you feel a defect in your Achilles tendon?
- 19 4 0 none Do you have pain in your heel?
- 20 4 0 none Do you have pain on the bottom of your heel?
- 21 4 0 none Do you have pain on the side of your heel?
- 22 4 0 none Do you have pain in your big toe?
- 23 4 0 none Is there a bump?
- 24 4 0 none Is your big toe angled to the side? (see photo)
- 25 4 0 none Is your big toe red hot and swollen?
- 26 4 0 none Is your foot flat?
- 27 4 0 none Is your foot getting flatter?
- 28 4 0 none Is your 2nd toe longer than your big toe?

H Select/Answer any question(s) that apply to your general physical state.

- 29 5 0 none Do you have a fever?

- 30 5 0 none Are you a diabetic?

H Please select any area(s) that you feel tenderness.

- 31 6 0 none medial malleolus check
- 32 6 0 none lateral malleolus check
- 33 6 0 none accessory navicular check
- 34 6 0 none plantar heel check
- 35 6 0 none medial heel check
- 36 6 0 none great toe MTP joint check
- 37 6 0 none 3rd webspace check
- 38 6 0 none 2nd metatarsal check
- 39 6 0 none sole of foot at arch check
- 40 6 0 none medial navicular check

H Please Select your Age

- 41 7 0 none 18-40
- 42 7 0 none 40-60
- 43 7 0 none 60-80
- 44 7 0 none Over 80

H A few more question(s).

- 45 8 0 none Does your toe bend downward?
- 46 8 0 none Does your toe ride over the next toe?

FIG. 29